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With Dr. Hayward's comments.

STATISTICS OF AMPUTATIONS

AT THE

MASSACHUSETTS GENERAL HOSPITAL.

STATISTICS

OF THE

AMPUTATIONS OF LARGE LIMBS

THAT HAVE BEEN PERFORMED

AT THE

MASSACHUSETTS GENERAL HOSPITAL,

FROM ITS ESTABLISHMENT, TO JAN. 1, 1850.

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STATISTICS OF AMPUTATIONS.

SOME years since, I published in the American Journal of Medical Sciences, at Philadelphia, a list of all the amputations of large limbs that had been performed at the Massachusetts General Hospital from the time of its establishment to January 1st, 1840. I have now prepared another list of the same kind, embracing all similar operations that have been done there from that period to January 1st, 1850.

It seemed to me desirable that the first table should be re-printed in connection with that which I have just finished, so as to give at one view the result of all the amputations that have ever been performed at that institution. This will enable any one, who is curious in these matters, to make such an analysis of the tables as may be likely to throw light on the subject at large.

It is true that the number of operations is not sufficiently great to authorize any very general conclusions ; at the same time every addition of this sort is important, as contributing to the collection of facts from which valuable inferences may hereafter be deduced.

It is only within a few years that the statistics of amputation have attracted any considerable degree of attention ; but what has already been done has wrought a great change in the opinions of surgeons as to the result of this operation. Mr. Benjamin Bell, who wrote nearly seventy years ago, thought that not more than 1 patient out of 20 died, on whom amputation was performed ; and yet it has been ascertained that 1 out of 4 died in 2000 cases that occurred in civil practice in Great Britain, and 1 out of 3 in 5000 cases in various parts of Europe. Yet no one can suppose that the operation was better done, or the after-treatment more judicious, in the time of Mr. Bell, than they are at present ; for it is well known that surgery, in all its departments, has made greater

progress within the last century than it had in all preceding time. The only explanation of this startling fact is, that there were formerly no records kept of the results of these operations; there were no data upon which such an opinion as that of Mr. Bell could rest, except what were derived from vague impressions. The memory is apt to be treacherous with regard to unfavorable cases; the successful ones are usually remembered, and too often published alone.

It is very desirable, therefore, to get as much information as possible on the subject; and in order to do this, every one who has many operations of this kind, either in private or hospital practice, should publish them all with their results. When a large amount of materials has been thus collected, a careful analysis of the whole will show, to some extent, no doubt, how far death, when it does take place after amputation, is attributable to the injury or disease for which the operation was performed, or to the operation itself, or to some other circumstance. It will serve to guide surgeons in some measure in deciding upon the expediency of operating; under what circumstances it can be done with the best prospect of success, or when it should be deferred or avoided altogether. This course is now in successful progress, and it is to be hoped that it may be continued so long as the operation of amputation may be found necessary.

[From the American Journal of Medical Sciences for May, 1840.]

Statistics of the Amputations of Large Limbs that have been performed at the Massachusetts General Hospital, from its establishment to January 1, 1840; with Remarks.

The following table, it is believed, contains a list of all the amputations of large limbs that have been performed at the Massachusetts General Hospital since the establishment of that institution. Such particulars are added as were thought calculated to throw light on the subject. These in a few instances are not so full perhaps as could be wished.

This remark applies especially to some of the early cases, which occurred at a period when the records of the hospital were not kept with that precision that has since been adopted. The omissions, however, are not thought to be such as will impair to any extent the value of the table.

The statistics of amputation are very desirable. They may probably lead to practical results of some importance. From what has recently been published, it is evident that amputation is more often followed by the death of the patient, than was formerly supposed. But to what ex-

tent this can be attributed to the operation itself, or to the disease or injury for which it was performed, cannot be precisely determined.

It has been stated, that more than one half of all whose limbs are amputated at some of the hospitals of Paris, die ; and it appears, from a very valuable paper published by Dr. Norris in the number of this Journal for August, 1838, that of 55 patients, being the whole number on whom amputation was performed in the Pennsylvania Hospital during a period of eight years, 21 died.

And yet these unfavorable results cannot fairly be attributed to the operation alone. There are a variety of causes that would exert a bad influence in the hospitals of Paris, that are not to be met with in those of our country. The former are more crowded, less comfortable, and badly ventilated in comparison with similar institutions here, and it is believed that the after-treatment is not so faithful and assiduous as with us.

Dr. Norris has, no doubt, suggested the true cause of the large proportion of fatal cases in the Pennsylvania Hospital, and that is that the operation was probably in many cases too long delayed, in the hope of saving the limb. No one can doubt, who knows anything of that institution, that nothing would be omitted that would be thought likely to add to the comfort and safety of the patient.

While it is no doubt true that amputation is sometimes too long delayed, it is equally certain that it is often performed when it might have been avoided. It is difficult in many cases to decide on the best course, but the operation should not be done without the clearest evidence of its necessity, for it is a hazardous and painful one, and, even when perfectly successful, leaves the patient in a mutilated state.

It will be seen by the subjoined table, that the results at the Massachusetts Hospital were somewhat more favorable than those at the Paris, and Pennsylvania Hospitals, above referred to. In a large proportion of the following cases, the amputation was done by the circular incision ; the flap operation was adopted occasionally, whenever there was reason to believe that a better stump could be made by it than by the other method. The dressings were always of a light and simple kind, consisting of two or three strips of adhesive plaster and a small compress and roller ; and yet there are some surgeons of the present day, who would perhaps regard these as more cumbersome than was necessary.

If the bleeding was slight, the dressings were applied before the patient left the operating room ; but if there was anything more than oozing from the veins, it was deferred till a few hours after.

TABLE I.—*Amputations of Large Limbs at the Massachusetts General Hospital, to Jan. 1, 1840.*

No.	Name.	Age	Time of admission.	Disease or injury.	Time of operation.	Place of operation.	Result.	Time of discharge or death.
1	Francis Vanvactor,	60	Jan. 26, 1822.	Compound fracture of right leg.	Feb. 5, 1822.	Below knee.	Died.	Feb. 11, 1822.
2	Sarah Ann Newell,	42	Nov. 1, 1823.	Large ulcer inside of left knee.	Nov. 18, 1823.	Above knee.	Recovered.	June 21, 1824.
3	John F. Manco,	22	Dec. 19, 1823.	Frost-bite—both feet.	Dec. 20, 1823.	Below knee, both legs.	Recovered.	April 2, 1824.
4	William C. Stone,	16	March 27, 1824.	White swelling seven years—left knee—much bent.	March 30, 1824.	Above knee.	Recovered.	May 4, 1824.
5	Lawrence Ryan,	18	May 29, 1824.	Swelling 18 months—right knee.	June 17, 1824.	Above knee.	Died.	June 30, 1824.
6	William Littlefield,	30	Nov. 19, 1824.	Compound fracture of right leg—trismus.	Dec. 4, 1824.	Above knee.	Died.	Dec. 5, 1824.
7	Thomas Hooper,	21	May 22, 1825.	Abscess and fungus—right foot.	May 30, 1825.	Below knee.	Recovered.	July 30, 1825.
8	Moses Cheney,	57	Aug. 22, 1825.	Ulcerated tumor—right arm.	Aug. 27, 1825.	Above elbow.	Recovered.	Oct. 6, 1825.
9	Luther Haskell,	41	Nov. 25, 1825.	Tumor on tibia—kicked by a horse 2 years previous.	Dec. 17, 1825.	Below knee.	Recovered.	March 1, 1826.
10	Levi Stearns,	22	Sept. 4, 1826.	Knee swelled three years—unable to walk 6 months.	Dec. 9, 1826.	Above knee.	Recovered.	Feb. 12, 1827.
11	John Currier,	18	March 27, 1827.	Ulcers on leg—knee bent.	May 9, 1827.	Above knee.	Recovered.	June 8, 1827.
12	Federal Burt,	34	April 7, 1827.	Fungus hæmatodes.	April 11, 1827.	Above elbow.	Recovered.	June 13, 1827.
13	Samuel G. Merrill,	8	April 8, 1827.	Swelled and stiff knee from injury, three months.	Dec. 8, 1827.	Above knee.	Recovered.	Dec. 14, 1827.
14	Margaret Twiss,	26	May 10, 1827.	Scrofulous disease of right elbow.	Mar. 1828.	Above elbow.	Recovered.	April 9, 1828.
15	Charles Richards,	30	Oct. 31, 1827.	Compound fracture of leg.	Nov. 10, 1827.	Below knee.	Recovered.	Jan. 15, 1828.
16	John Cleverly,	23	April 23, 1828.	Painful tumor of knee, 10 years.	May 9, 1828.	Above knee.	Died.	May 13, 1828.
17	John Evans,	17	Nov. 13, 1828.	Compound fracture.	Nov. 19, 1828.	Above knee.	Recovered.	Dec. 26, 1828.
18	George Hatten,	24	Dec. 6, 1828.	Dislocation of patella—Contraction of joint—Exceedingly painful.	Dec. 20, 1828.	Above knee.	Recovered.	Jan. 28, 1829.
19	Abigail Day,	50	March 4, 1829.	Fungus hæmatodes.	March 5, 1829.	Above knee.	Recovered.	May 9, 1829.
20	James Dowsley,	27	May 15, 1829.	Compound fracture of leg.	June 3, 1829.	Below knee.	Died.	June 3, 1829.
21	Henry Mills,	23	May 29, 1829.	Comp'd, comm. and complicated fracture leg and knee.	May 30, 1829.	Above knee.	Died.	July 4, 1829.
22	Fernando Worcester,	12	Nov. 18, 1829.	Severe injury of knee joint.	Dec. 5, 1829.	Above knee	Recovered.	March 15, 1830.
23	John Hatheway,	46	Jan. 27, 1830.	Ulcers on foot 20 years—on leg 10 months.	Feb. 11, 1830.	Below knee.	Recovered.	March 30, 1830.
24	Elias Hine,	49	Jan. 29, 1830.	Fracture of both bones of left leg.	Feb. 26, 1830.	Below knee.	Recovered.	May 8, 1830.

A Table of the Amputations of Large Limbs—Continued.

No.	Name.	Age	Time of admission.	Disease or injury.	Time of operation.	Place of operation.	Result.	Time of discharge or death.
25	Richard Alley,	49	1830. June 24,	Oblique fracture of both bones of right leg. White swelling of knee, three years. Irritable ulcers from injury.	1830. June, 1831.	Below knee.	Recovered.	Aug. 30, 1831.
26	Moses Chase,	23	June 24,		Nov. 27.	Above knee.	Died.	Dec. 21, 1830.
27	Abraham D. Phillips,	43	Dec. 4,		Dec. 13.	Below knee.	Recovered.	March 11, 1831.
28	Eljah N. Barker,	10	1831. June 23,	Thigh crushed by an anchor.	1831. June 29.	Above knee.	Recovered.	Nov. 1, 1831.
29	Robert Caswell,	13	1832. Jan. 2,	White swelling from infancy—injured seven years after—limb useless.	1832. Jan. 7.	Above knee.	Recovered.	Feb. 25, 1832.
30	Joseph Fernald,	26	March 21,	Knee strained six years before entrance—bones felt through fistula.	April 14.	Above knee.	Recovered.	July 13, 1832.
31	James Ryan,	27	April 25,	Integuments of leg crushed by wagon-wheel.	April 26.	Below knee.	Recovered.	July 17, 1832.
32	Benjamin Nourse,	57	June 8,	Ulcer around leg, 20 years.	Jan. 1833.	Below knee.	Recovered.	March 12, 1833.
33	Mary C. White,	27	July 9,	Abscess inside right knee, 23 years—constant discharge—bones carious.	November.	Above knee.	Recovered.	Jan. 14, 1833.
34	Charles West,	21	Aug. 23,	Injury of knee—subsequently great inflammation.	Oct. 26.	Above knee.	Recovered.	Dec. 13, 1832.
35	Joseph Bragden,	37	Sept. 26,	Chronic disease and extensive caries of tibia.	Oct. 20.	Above knee.	Recovered.	Dec. 22, 1832.
36	Eliza Low,	21	1833. Jan. 11,	Chronic inflammation of knee—health failing.	1833. Feb. 2.	Above knee.	Recovered.	April 13, 1833.
37	Henry T. Spear,	19	March 2,	Deformed foot, ankle ankylosed and painful.	March 7.	Below knee.	Recovered.	April 10, 1833.
38	John Jordau,	26	May 8,	White swelling.	May 16.	Above knee.	Recovered.	July 11, 1833.
39	Hamah M. Andrews,	23	Oct. 29,	Stiffness of right knee four years—abscess 3 weeks.	Dec. 23.	Above knee.	Recovered.	Feb. 19, 1834.
40	Hosea Sargent,	35	Dec. 25,	Fungus over ligamentum patellæ from blow 2 years before.	Jan. 1834.	Above knee.	Died.	Jan. 13, 1834.
41	Patrick Donahua,	24	1834. Jan. 29,	Foot crushed by railroad car—same day.	1834. Feb. 8.	Below knee.	Died.	Feb. 13, 1834.
42	Hannah Bray,	14	May 31,	Abscess on back right hand from blow 1 year before.	Nov. 8.	Below elbow.	Recovered.	Nov. 26, 1834.
43	Thomas Marshall,	25	June 20,	Right wrist lacerated by cannon—same day—(face torn, &c.)	June 27.	Below elbow.	Died.	June 29, 1834.
44	Ephraim M. Spear,	37	Nov. 12,	Part of foot amputated three years before for frost-bite—stump not healed.	Nov. 15.	Below knee.	Recovered.	Dec. 17, 1834.
45	James Neal,	29	1835. April 3,	Left hand shattered by bursting of gun day of entrance.	1835. April 8.	Below elbow.	Recovered.	May 13, 1835.

A Table of the Amputations of Large Limbs—Continued.

No.	Name.	Age	Time of admission.	Disease or injury.	Time of operation.	Place of operation.	Result.	Time of discharge or death.
46	Elizabeth P. Chapman,	31	1835. Dec. 4,	Knee injured by fall one year before.	1835. Dec. 12,	Above knee.	Recovered.	May 22, 1836.
47	Robert Boyd,	33	Dec. 20,	Sloughy ulcers about right ankle.	Feb. 1836,	Below knee.	Recovered.	March 31, 1836.
48	Daniel Fuller,	43	1836. Feb. 6,	Indolent ulcer of right foot from frost-bite 14 years before.	1836. Feb. 20,	Below knee.	Died.	March 16, 1836.
49	Jerry Ryan,	31	June 2,	Compound & comminuted fracture of both legs—same day.	June 2,	1 above, 1 below knee.	Died.	June 2, 1836.
50	James Achworth,	28	Sept. 13,	Scrofulous disease of knee.	Dec. 10,	Above knee.	Recovered.	Jan. 30, 1837.
51	Mary Tyrrell,	24	Dec. 16,	Right knee ankylosed—abscess—bones carious.	Dec. 17,	Above knee.	Recovered.	Jan. 13, 1837.
52	Wm. A. Waterhouse,	43	1837. Jan. 8,	Frost-bite of both feet 11 days before.	1837. Jan. 21,	Both legs, below knee.	Recovered.	March 12, 1837.
53	Erastus Jennison,	27	April 25,	Scrofulous disease of knee, four years.	June 10,	Above knee.	Recovered.	July 15, 1837.
54	James Kennard,	22	Sept. 8,	Swelling of knee, five years.	Nov. 14,	Above knee.	Recovered.	Dec. 18, 1837.
55	Martin St. John,	39	Sept. 24,	Leg crushed by bank of earth, day before.	Sept. 24,	Above knee.	Died.	Sept. 24, 1837.
56	Eleanor Ryan,	25	Nov. 23,	Right side of head injured by truck, when four years old, followed by numbness of left foot, pain and deformity.	Nov. 25,	Below knee.	Recovered.	Jan. 6, 1838.
57	John Connor,	30	1838. March 5,	Ankle crushed by bank of earth.	1838. March 5,	Below knee.	Died.	March 14, 1838.
58	William Burbank,	23	April 12,	Hand lacerated by a steam engine.	April 12,	Below elbow.	Recovered.	May 17, 1838.
59	John Newcomb,	33	April 17,	Fungous ulcer on right leg from boiling water, as counter-irritant.	April 21,	Below knee.	Recovered.	July 14, 1838.
60	William Conners,	45	Aug. 22,	Both legs broken and crushed by stone wall.	Aug. 23,	Above knee (right).	Died.	Sept. 6, 1838.
61	J. W. Fullick,	27	Nov. 5,	Compound and comminuted fracture of leg and knee.	Nov. 5,	Above knee.	Recovered.	Feb. 18, 1839.
62	George Clark,	26	1839. Jan. 16,	Compound fracture of leg—great laceration.	1839. Jan. 17,	Below knee.	Recovered.	March, 1839.
63	William Burbank,	17	March 22,	Wound of hand.	March 22,	Below elbow.	Recovered.	April 22, 1839.
64	Ruth A. Blaisdel,	13	April 3,	Scrofulous disease of elbow, three years.	June 7,	Above elbow.	Recovered.	June 27, 1839.
65	Robert Fletcher,	37	May 20,	Ulcer on legs, 24 years after injury.	May 25,	Above knee.	Recovered.	July 12, 1839.
66	Jacob Hersey,	72	Aug. 6,	Fungoid ulcer on back of right hand.	Aug. 16,	Below elbow.	Recovered.	Aug. 30, 1839.
67	John Manyan,	29	Nov. 6,	Chronic carious ulcer of ankle.	Nov. 17,	Below elbow.	Recovered.	Jan. 10, 1840.

Secondary hemorrhage was not frequent, though it sometimes occurred; pressure was generally sufficient to arrest it, but occasionally it was found necessary to open the stump, and tie one or more vessels. In one case where hemorrhage occurred twelve days after the operation, from a diseased state of the posterior tibial artery, the femoral artery was tied. No one who had secondary hemorrhage died, and though it sometimes debilitated the patient, in no case was there any permanently injurious effect from it.

In all the cases it was attempted to heal the wound by the first intention, and in a few instances it was completely successful, but in by far the greater number it was only partially so.

It has not been the usual practice at the Massachusetts Hospital to administer an opiate before an operation, though in a few instances it has been done. In one case, where amputation was performed on a patient with delirium tremens, twelve grains of opium were given shortly before the operation; he became drowsy soon after, and recovered.

It was not thought necessary to indicate the exact part of the limb at which each operation was done, but it was supposed to be enough to say whether it was above or below the knee. It may be proper to add, that in all the cases below the knee, it is to be understood that the amputation was performed above the ankle.

From this table, it appears that there were 70 operations on 67 patients; three patients having two limbs removed. In one of these three cases, one operation was above and the other below the knee, and in the other two, both operations were below; the first patient died, and the other two did well.

Of the whole number operated on, 15 died and the remainder recovered, at least so far as to be able to leave the hospital; though it is probable that in some instances the disease may have returned.

There were 34 patients who had the thigh amputated, and one of these had the other leg taken off at the same time below the knee; of this number, 9 died. Of 23 patients whose legs were amputated below the knee, two having both legs removed, 5 died; and of the 10 who had an arm amputated, six below and four above the elbow, 1 died.

This goes to confirm the prevailing opinion among surgeons, that amputation of the lower extremities is more often followed by fatal consequences than that of the upper, and that death takes place more frequently after amputation of the thigh, than after that of the leg. More than a quarter of those whose thighs were amputated died, while there was but little more than 1 death in 5 among those whose legs were

removed below the knee, and only 1 of the 10 whose arms were amputated. This patient, too, died of delirium tremens. The operation to be sure did not arrest the disease, but apparently contributed nothing to the fatal result.

This table tends also to support the opinion, that patients who undergo amputation for chronic diseases are much more likely to recover than those in whom it is performed in consequence of recent accident. Of the first class, there were 45 patients afflicted with various diseases, and of this number all recovered but 5; and of the remaining 22, whose limbs were removed on account of recent injuries, no less than 10 died; being nearly half of the latter, and only 1 in 9 of the former.

This fact certainly gives support to the opinion, that a state of high health is not favorable to surgical operations; and it also tends to show that death after amputation is not by any means attributable in all cases to the operation alone; for if it were, the proportion of deaths should be as large among one class of patients as among the other. There can be no doubt, I think, that the result is influenced very much not only by the age and constitution of the patient and the disease or injury for which the operation is performed, but also by the period at which it is done. I have before said that I thought that amputation was "often performed when it might have been avoided." But this remark applies principally to cases of recent injury. In those of chronic diseases of the limbs, the error is more apt to be of the opposite character; the operation is either not performed, or if done at all, frequently not till it is too late. It cannot be denied, I think, that there is a disposition at the present day to defer amputation too long in cases of diseased limbs; there is an unwillingness to admit that the morbid affection is beyond the reach of remedies, and the operation is too often postponed till other parts become affected, or the system is worn down by continued irritation. At length the limb is removed; but the patient, already exhausted by disease and long suffering, is hurried to his end by the very means that might have saved him, if they had been earlier employed.

If amputation is frequently too long delayed in chronic diseases of the limbs, it is, I fear, very often resorted to in recent injuries earlier than it should be. Many limbs that have been removed, might probably have been saved; but where this cannot be done, it is rare that much inconvenience would follow from a little delay.

In most cases of accident sufficiently severe to justify amputation, the whole system has suffered a great shock, and an operation at this time, before re-action is fairly established, is very likely to cut off what little

chance the patient might otherwise have of recovery. While the extremities are cold and the action of the heart is feeble, the local injury is hardly, if at all, perceived, and adds nothing to the patient's sufferings. An operation cannot be required then : and yet how often it is done at that period ; the better judgment of the surgical attendant sometimes being overruled by the importunate interference of the by-standers.

If the injury be not so serious as to cause almost immediate death, reaction usually comes on with proper management in a few hours, and then, if an operation be necessary, it can be done with a much greater prospect of success.

With regard to the ages of the patients operated on, it appears that there were—

		Under 20 yrs. of age 13.		Of this number 1 died.	
Over 20 and not exceeding	30	"	31.	"	8 "
" 30	"	40	"	9.	3 "
" 40	"	50	"	10.	2 "
" 50	"	60	"	3.	1 "
		Over 70	"	1.	0 "

Whole number, 67. No. of deaths, 15.

Boston, March 24, 1840.

TABLE II.

This table, it will be perceived, is prepared in a manner very similar to the preceding one. It differs from it only in noting the kind of operation, whether it were flap or circular, and also in stating every instance in which a patient inhaled any of the anæsthetic agents.

It appears from it, that from January, 1840, to January, 1850, there were 76 amputations of large limbs performed on 74 patients, two patients having two limbs removed at the same time. One of them had one leg taken off above the knee, and the other below ; and the other patient had one arm amputated above the elbow, and the other below. The first patient died, and the other recovered.

There were 17 deaths ; one of these was from tetanus, and another from phthisis. All the amputations of the lower extremity were above the ankle, and all those of the upper were above the wrist.

TABLE II.—*Amputations of Large Limbs performed at the Mass. Gen. Hospital, from Jan. 1, 1849, to Jan. 1, 1850.*

No.	Name.	Age.	Time of admission.	Disease or injury.	Time of operation.	Place and kind of operation.	Result.	Time of discharge or death.	Remarks.
1	John Nowland,	23	1839. Nov. 26,	Compound and comminuted fracture of the thigh.	1840. July 25.	Above knee—flap.	Died.	July 25, 1840.	
2	Stillman Hubbard,	32	1840. Dec. 24,	Caries of elbow.	1841. March 13.	Above elbow—circular.	Recovered.	April 3, 1841.	
3	Bridget Duffie,	50	1841. Aug. 14,	Compound fracture of leg.	Aug. 14.	Below knee—circular.	Recovered.	Oct. 9, 1841.	
4	Samuel Brown,	56	1842. March 14,	Osteo-sarcoma of hand.	March 19.	Below elbow—circular.	Recovered.	April 2, 1842.	
5	John F. Homer,	34	March 16,	Chronic ulcer of leg.	March 19.	Above knee—circular.	Recovered.	May 5, 1842.	
6	Jedediah Little,	73	Oct. 13,	Chronic ulcer of leg.	Nov. 5.	Below knee—flap.	Recovered.	Dec. 26, 1842.	
7	Olwyn T. Jones,	19	Nov. 16,	Disease of knee.	Nov. 19.	Above knee—circular.	Recovered.	Dec. 29, 1842.	
8	Henry Walker,	14	1843. May 4,	Tubercular disease of hand.	1843. May 10.	Below elbow—circular.	Recovered.	July 5, 1843.	
9	Elizabeth Pickett,	17	June 10,	Disease of knee.	Oct. 14.	Above knee—flap.	Died.	Nov. 12, 1843.	
10	Edward Flegg,	45	Nov. 17,	Caries in stump.	Nov. 18.	Below knee—circular.	Recovered.	Dec. 16, 1843.	
11	Granv. D. Bragdon,	30	1844. Nov. 7,	Disease of knee.	1844. Dec. 14.	Above knee—flap.	Recovered.	Feb. 18, 1845.	
12	Thomas Smith,	53	1845. March 6,	Compound and comminuted fracture of the leg.	1845. March 6.	Above knee—circular.	Recovered.	July 1, 1845.	
13	Daniel Tarbox,	60	March 10,	Ulcer of leg—20 years.	March 15.	Below knee—circular.	Recovered.	April 22, 1845.	
14	Lewis C. Blaisdell,	31	April 15,	Compound and comminuted fracture of the wrist.	April 15.	Below elbow—circular.	Died.	April 19, 1845.	
15	Michael Welch,	24	May 19,	Scrofulous disease of knee.	June 17.	Above knee—circular.	Recovered.	Aug. 25, 1845.	
16	John Field,	40	July 17,	Compound fracture of leg.	Oct. 4.	Below knee—circular.	Recovered.	Oct. 29, 1845.	
17	Michael Devine,	21	July 25,	Compound and comm. frac. of leg.	Aug. 9.	Below knee—circular.	Recovered.	Sept. 9, 1845.	
18	Hector Holmes,	21	Aug. 5,	Gangrene from injury to thigh.	Aug. 16.	Above knee—flap.	Recovered.	Oct. 3, 1845.	
19	Thomas Doland,	25	Aug. 7,	Compound and comminuted fracture of the thigh.	Aug. 16.	Above knee—circular.	Recovered.	Oct. 13, 1845.	
20	John E. Barnes,	19	Oct. 17,	Ulcer, with contracted knee.	Nov. 8.	Above knee—flap.	Recovered.	Dec. 2, 1845.	
21	Eben C. Johnson,	12	Dec. 26,	Disease of knee.	Dec. 27.	Above knee—flap.	Died.	Dec. 28, 1845.	

A Table of the Amputations of Large Limbs—Continued.

No.	Name.	Age	Time of admission.	Disease or injury.	Time of operation.	Place and kind of operation.	Result.	Time of discharge or death.	Remarks.
22	John Hooper,	10	1845.		1846.				
23	Alice Mohan,	13	Sept. 18,	Disease of knee.	May 23,	Above knee—flap.	Recovered.	July 2, 1846.	Inhaled sul. ether.
24	Theophilus Peltier,	35	March 7,	Disease of knee.	Nov. 7,	Above knee—flap.	Recovered.	Dec. 22, 1846.	Inhaled sul. ether.
			Nov. 16,	Compound and comminuted fracture of the leg.	Nov. 16,	Below knee—flap.	Recovered.	April 3, 1847.	Inhaled sul. ether.
25	Ann Kerr,	18	1846.		1847.				
26	Catharine Crowley,	56	July 8,	Periostitis of foot.	April 3,	Below knee—flap.	Recovered.	May 13, 1847.	Inhaled sul. ether.
27	Fanny Abbot,	42	Dec. 23,	Necrosis of tibia.	Jan. 9,	Below knee—flap.	Recovered.	April 20, 1847.	Inhaled sul. ether.
				Disease of ankle.	Jan. 2,	Below knee—circular.	Recovered.	Feb. 23, 1847.	Inhaled sul. ether.
28	James Mitchell,	27	1847.		Feb. 20,		Recovered.	July 31, 1847.	Inhaled sul. ether.
29	Dennis Pickett,	30	April 6,	Compound fracture of knee.	April 7,	Above knee—circular.	Died.	April 9, 1847.	Inhaled sul. ether.
30	Patrick Conny,	39	March 24,	Compound and comminuted fracture of the leg.	March 24,	Below knee—circular.	Died.	March 30, 1847.	Inhaled sul. ether.
31	Patrick Kidney,	22	May 25,	Lacerated wound of arm.	June 8,	Above elbow—circular.	Recovered.	Sept. 2, 1847.	Inhaled sul. ether.
32	Abner Johnson,	60	May 31,	Necrosis of tibia.	June 5,	Above knee—circular.	Died.	July 4, 1847.	Inhaled sul. ether.
33	Francis Manuel,	19	June 14,	Disease of fibula.	Oct. 2,	Below knee—flap.	Recovered.	May 20, 1848.	Inhaled sul. ether.
34	Jacob D. Edwards,	45	June 24,	Compound fracture of arm.	June 24,	Above elbow—circular.	Died.	June 24, 1847.	Inhaled sul. ether.
35	Benj. Hammond,	39	July 12,	Disease of knee.	July 14,	Above knee—flap.	Recovered.	Aug. 9, 1847.	Inhaled sul. ether.
36	S. H. Jones,	25	Aug. 27,	Fungus hæmatodes—leg.	Sept. 4,	Above knee—flap.	Recovered.	Oct. 28, 1847.	Inhaled sul. ether.
37	Michael Sullivan,	34	Sept. 1,	Disease of knee.	Nov. 6,	Above knee—flap.	Died.	Nov. 12, 1847.	Inhaled sul. ether.
38	Patrick Doherty,	40	Sept. 2,	Compound fracture of foot.	Sept. 2,	Below knee—circular.	Died.	Sept. 3, 1847.	Inhaled sul. ether.
39	Nathan Butler,	60	Sept. 15,	Malignant disease of elbow.	Sept. 18,	Above elbow—circular.	Recovered.	Dec. 13, 1847.	Inhaled sul. ether.
40	John Madden,	25	Sept. 21,	Compound fracture of elbow.	Sept. 27,	Below knee—flap.	Recovered.	Jan. 14, 1848.	Inhaled sul. ether.
41	Peter Caton,	26	Sept. 27,	Wound of foot.	Sept. 27,	Below knee—circular.	Recovered.	Dec. 21, 1847.	Inhaled sul. ether.
42	John Nightingale,	63	Sept. 29,	Malignant disease of arm.	Oct. 2,	Above elbow—circular.	Recovered.	Dec. 13, 1847.	Inhaled sul. ether.
43	Michael Clark,	23	Nov. 27,	Gangrene from ligature of the femoral artery.	1848.		Recovered.	Aug. 5, 1848.	Inhaled chloroform.
44	Michael McSoley,	22	1848.		Jan. 10,	Above knee—flap.			
45	Benj. T. Per Kins,	33	Feb. 13,	Disease of knee.	March 11,	Above knee—flap.	Recovered.	May 31, 1848.	Inhaled sul. ether.
46	Eliz. Phenian,	6	April 7,	Compound fracture of knee.	April 7,	Above knee—flap.	Died.	April 12, 1848.	Inhaled sul. ether.
47	James Smith,	20	March 13,	Compound fracture of leg.	March 13,	Below knee—flap.	Recovered.	July 31, 1848.	Inhaled sul. ether.
			March 31,	Compound and comminuted frac. of leg.	March 31,	Above knee—flap.	Recovered.	May 8, 1848.	Inhaled chlo. ether.

A Table of the Amputations of Large Limbs—Continued.

No.	Name.	Age	Time of admission.	Disease or injury.	Time of operation.	Place and kind of operation.	Result.	Time of discharge or death.	Remarks.
48	Dennis Casey,	23	April 23,	Injury to arms (powder)	April 23,	Above & bel. elb.—flap	Recovered.	Aug. 4, 1848.	Inhaled chlo. ether.
49	Hannah Donovan,	30	April 27,	Compound fracture of foot.	April 27,	Below knee—flap.	Recovered.	Aug. 10, 1848.	Inhaled chlo. ether.
50	James M. Jones,	23	June 7,	Disease of knee.	July 15,	Above knee—circular.	Recovered.	Aug. 13, 1848.	Inhaled sul. ether.
51	John Canfield,	10	Nov. 6,	Compound fracture of foot.	Nov. 11,	Below knee—flap.	Died.	Nov. 18, 1848.	Inhaled sul. ether.
52	Dennis Hurley,	36	Nov. 17,	Rupture of femoral artery.	Nov. 18,	Above knee—circular.	Recovered.	April 7, 1849.	Inhaled sul. ether.
53	Timothy Lynch,	24	Dec. 7,	Gangrene of foot—accident.	Dec. 9,	Below knee—flap.	Recovered.	March 2, 1849.	Inhaled sul. ether.
54	Lucy Thresher,	25	Dec. 15,	Malignant disease of hand.	Dec. 25,	Below elbow—circular.	Recovered.	Jan. 13, 1849.	Inhaled sul. ether.
55	John Rogers,	23	Aug. 23,	Scrofulous disease of foot.	1849.				
56	Zimri Heywood,	10	Dec. 11,	Disease of knee.	Jan. 18,	Below knee—circular.	Recovered.	Feb. 14, 1849.	Inhaled sul. ether.
					March 31,	Above knee—flap.	Recovered.	May 9, 1849.	Inhaled chlo. ether.
57	Thomas Doroty,	30	Feb. 11,	Compound and comminuted frac. of leg.	March 17,	Above knee—flap.	Recovered.	May 10, 1849.	Inhaled chlo. ether.
58	Bridget Shea,	23	April 2,	Scrofulous disease of foot.	May 2,	Below knee—flap.	Recovered.	July 4, 1849.	Inhaled chlo. ether.
59	Ann J. Prince,	17	April 3,	Ulcer of foot—16 years.	April 7,	Below knee—flap.	Recovered.	July 4, 1849.	Inhaled chlo. ether.
60	Morris Brown,	20	April 2,	Compound and comminuted frac. of leg.	April 2,	Above knee—circular.	Died.	April 2, 1849.	Inhaled chlo. ether.
61	Lawrence Britain,	22	April 7,	Compound fracture of arm.	April 7,	Above elbow—flap.	Recovered.	May 23, 1849.	Inhaled chlo. ether.
62	Andrew Hall,	27	May 8,	Compound and comminuted frac. of leg.	May 30,	Below knee—flap.	Died.	May 23, 1849.	Inhaled chlo. ether.
63	Caleb Kendall,	42	May 9,	Necrosis of femur.	May 9,	Above knee—flap.	Recovered.	Aug. 17, 1849.	Inhaled chlo. ether.
64	James Brady,	37	May 12,	Compound fracture of hand.	May 12,	Below elbow—flap.	Recovered.	July 22, 1849.	Inhaled chlo. ether.
65	James McKoy,	39	June 19,	Compound and comminuted fracture of thigh and leg.	June 20,	Above & bel. kn.—flap.	Died.	June 20, 1849.	Inhaled sul. ether.
66	Charles Dennett,	34	July 20,	Compound fracture of leg.	Aug. 22,	Below knee—circular.	Died.	Sept. 3, 1849.	Inhaled sul. ether.
67	Lawrence Mazenty,	25	Aug. 24,	Compound fracture of leg.	Sept. 11,	Below knee—flap.	Recovered.	Feb. 2, 1850.	Inhaled sul. ether.
68	Thomas Dyke,	33	Sept. 4,	Malignant disease in fibula.	Sept. 5,	Above knee—circular.	Recovered.	Nov. 3, 1849.	Inhaled sul. ether.
69	William G. Hunting,	22	Sept. 7,	Disease of knee.	Sept. 8,	Above knee—circular.	Recovered.	Nov. 30, 1849.	Inhaled sul. ether.
70	Sylvester O. Sullivan	35	Oct. 6,	Compound and comminuted fracture of the leg.	Oct. 6,	Below knee—circular.	Recovered.	Dec. 25, 1849.	Inhaled chlo. ether.
71	Samuel R. Emmons,	48	Oct. 17,	Necrosis of femur.	Oct. 20,	Above knee—circular.	Recovered.	July 23, 1850.	Inhaled chlo. ether.
72	Daniel Hogan,	27	Oct. 23,	Malignant disease of thigh.	Oct. 24,	Above knee—circular.	Died.	Dec. 23, 1849.	Inhaled chlo. ether.
73	Theo. S. Oushing,	32	Nov. 27,	Ulcer, in cicatrix of burn.	Dec. 15,	Above knee—flap.	Recovered.	Feb. 7, 1850.	Inhaled sul. ether.
74	David Long,	21	Dec. 15,	Compound fracture of thigh.	Dec. 15,	Above knee—circular.	Recovered.	Feb. 1, 1850.	Inhaled sul. ether.

There were 35 amputations of the thigh, and 10 deaths.

"	28	"	below the knee, and 5	"
"	7	"	above the elbow, and 1	"
"	6	"	below the elbow, and 1	"

76 amputations.

17 deaths.

Ten of the amputations of the thigh were performed in consequence of injury, and 25 in consequence of disease, and 5 of each of these two classes of patients died ; that is to say, one half of the former and one fifth of the latter.

On the five patients who died after amputation below the knee, the operation was performed in every instance in consequence of injury ; and in the two fatal cases of amputation of the arm, the operation was done on patients who had severe compound fractures.

Forty of the patients had amputation performed in consequence of disease, and only 5 died ; being 1 in 8 : and the remaining 34 had been injured, and 12 died, being more than one third.

It is apparent, therefore, that the fatal result is not altogether attributable to the operation, but is in no small degree dependent upon the injury which the patient has received, or the peculiar state of system induced by it.

There is one circumstance that has probably been observed by every one who has had frequent occasion to amputate for rail-road accidents, and that is the great tendency of the parts in the neighborhood of the injury to slough after the operation. These accidents, when sufficiently severe to require amputation, are usually caused by a wheel of a locomotive engine or rail-way car passing over the limb. This in most instances produces a compound and comminuted fracture of the worst kind.

If the operation be performed in the immediate neighborhood of the injury, however sound the parts may appear to be at the time, they will in most cases slough to a greater or less extent, and leave the bone protruding beyond the soft parts, so as to require the removal of a portion of it at a subsequent period. This is on every account a very unpleasant result, and we cannot feel confident that it may not happen, unless the operation be done at a greater distance from the injury, than it is usual to do it in ordinary cases of accident. The vitality of the parts seems to be destroyed to a greater extent than is common in similar accidents that are caused by a less degree of violence. Or perhaps it would be more proper to say, that their condition resembles that which is spoken

of by military surgeons under the name of local asphyxia, as sometimes occurring from gun-shot wounds. It is a state of suspended animation, differing from death only in the fact, that the power of resisting decomposition is for a time retained, but the debilitating effect of an operation is very sure to destroy this.

It appears that in one half of the operations the circular amputation was adopted, and in the other half the flap. Nine of the former died, and eight of the latter.

Forty-eight of the patients inhaled some anæsthetic agent; 12 of this number died. It is well known, that it was at this hospital that these agents were first successfully employed in general operative surgery; and so entirely satisfactory have been the results, that no operation of any importance is now performed there, without the patient being previously rendered insensible to suffering by these means. It may not be amiss to add, that no fatal effects have followed their administration, nor has any serious ill consequence in a single instance ensued from it.

It appears, then, from these tables, that the whole number of amputations of large limbs that have ever been performed at the Hospital, is 146, on 141 patients. Of this number, 32 died.

Eighty-five had their limbs removed in consequence of disease; of whom 10 died.

Fifty-six in consequence of injury; of whom 22 died; being 1 in 8½ of the former, and more than 1 in 3 of the latter.

69 patients had the thigh amputated—19 died.

50 had the leg removed below the knee—10 died.

11 had amputation above the elbow — 1 died.

11 “ below “ — 2 died.

141	32
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The ages of the patients were as follows:

Under 20 years of age, 26, of whom 4 died.

Between 20 and 30 56, “ 11 died.

“ 30 and 40 28, “ 10 died.

“ 40 and 50 18, “ 5 died.

“ 50 and 60 7, “ 1 died.

“ 60 and 70 4, “ 1 died.

Over 70 2, “ 0 died.

Boston, September, 1850.]

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32

